Philip Williams and Associates, Ltd., "Memorandum Regarding Channel Geomorphic Assessment of Long Canyon" (June 12, 2007; 2007d)

PWA
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M E M O R A N D U M

Date:	June 12, 2007
To:	Matt Carpenter and Corey Harpole
Organization:	Newhall Land and Farming Company
From:	Andrew Collison
PWA Project #:	1820.02
PWA Project Name:	Newhall Ranch
Subject:	Channel geomorphic assessment of Long Canyon
Copy(ies) To:	Lisa Austin, File

Purpose of Investigation

PWA conducted reconnaissance-level geomorphic assessments and collected sediment samples from the beds and banks of Long Canyon near Valencia, CA, to support sediment transport modeling, geomorphic and channel design activities.

Data Collection

Fieldwork was carried out between February 7th and 9th 2006 with repeat visits to selected sites in summer of 2006. The channel was walked for its entire length within the Newhall Ranch project area. A total of 18 sediment samples were taken from the channel bed. Sediment samples were collected approximately every 1000 feet along the channels. Sites were selected by pre-programming GPS coordinates along the streambed at fixed intervals and then identifying geomorphically-typical reaches close to the site. At each sampling point the nearest mid–channel or point bar was selected and a sample taken from a position one third from the upstream edge of the bar, in accordance with sediment sampling protocols outlined by Reid and Dunne (1996) and Thomas and Gee (2005). Sediment taken from this location is believed to be representative of average-sized sediment that is in transport through the system. Samples were collected by digging a 6 inch pit in the bed and transferring the entire sample to a polythene bag. Bank samples were taken from actively eroding banks where they appeared to be the main source of sediment in the channel. Typically in all creeks studied the bed samples had a thin veneer of gravel but were dominated by sand beneath that. Samples were transferred to Cooper Testing Laboratory for particle size distribution. Most samples were clearly non-cohesive and were analyzed by wet sieving. A few appeared to be cohesive and were sampled using the hydrometer method to differentiate silt and clay from coarser sediment.

The sample locations and particle size distribution curves are shown in the attached figure, with typical sediment sizes and channel geomorphic assessment for context. A reconnaissance-level geomorphic assessment was conducted, primarily focused on the degree of channel incision (disconnection between the bankfull channel and floodplain). This was assessed by running a HEC-RAS model with the 5-year flow (model and data supplied by PACE) to determine the extent to which the 5-year flow was confined in a well defined bankfull channel or not. This was based on the observation of SCCWRP (Coleman et. al. 2005) that stable channels in this area contain the 5-year flow. Where the 5-year flow did not fill what appeared to be the bankfull channel and qualitative geomorphic evidence supported the assessment the channel was classified as incised or widening. Figures from the reconnaissance are attached to this memo.

Summary of Sediment Characteristics

All 18 samples were classified as sand with most defined as 'poorly graded sand with gravel'.

Summary of Geomorphic Assessment

Long Canyon is characterized by a very steep, unstable headwaters reach (outside the project area) that becomes more stable downstream. Most of the canyon is then stable to moderately stable with some sections of wide floodplain, before passing though a culvert and into a constructed earth channel that conveys it to the Santa Clara River. The upstream headwaters reaches (Images 243a and 242a) are deeply incised and highly unstable, with actively eroding channels. Downstream the channel becomes somewhat more stable but remains slightly confined (Images 242d and c) and has knickpoints (Image us_242d) that demonstrate channel incision. The channel passes through a slightly incised but undersized reach (Images 241c and b) before entering a slightly aggrading section (Images 240a and b). The channel then enters a confined reach (Images 239) with actively eroding relict terraces on the outside bend before emerging into another stable, unconfimed reach with an extensive active floodplain (Images 238). Downstream the channel becomes slightly incised, potentially due to the presence of the nearby road (Images 237) (increasing runoff and providing a constriction) but still has access to a low floodplain on one side. Further downstream the channel becomes more stable (Images 236) though with eroding outside bends where the channel has migrated against relict terraces (Images 235). The channel passes through a short, slightly incised reach (Images 234) before widening and slightly aggrading (Images 233, 232). Downstream the channel becomes slightly confined with a higher floodplain, but still overall relatively stable conditions (Images 231). Below this point the creek enters a constructed trapezoidal flood channel that conveys it to the Santa Clara River.

References

Coleman, D., MacRae, C. and Stein, E.D., 2005, Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams.

Reid, L. M. and T. Dunne, 1996. Rapid Evaluation of Sediment Budgets. GeoEcology Paperback. Catena Verlag Gmbh. 164 p.

Thomas, William, and Gee, D. M. 2005. Sedimentation in Stream Networks (HEC-6T) – Supplement to the User Manual. 36 p.

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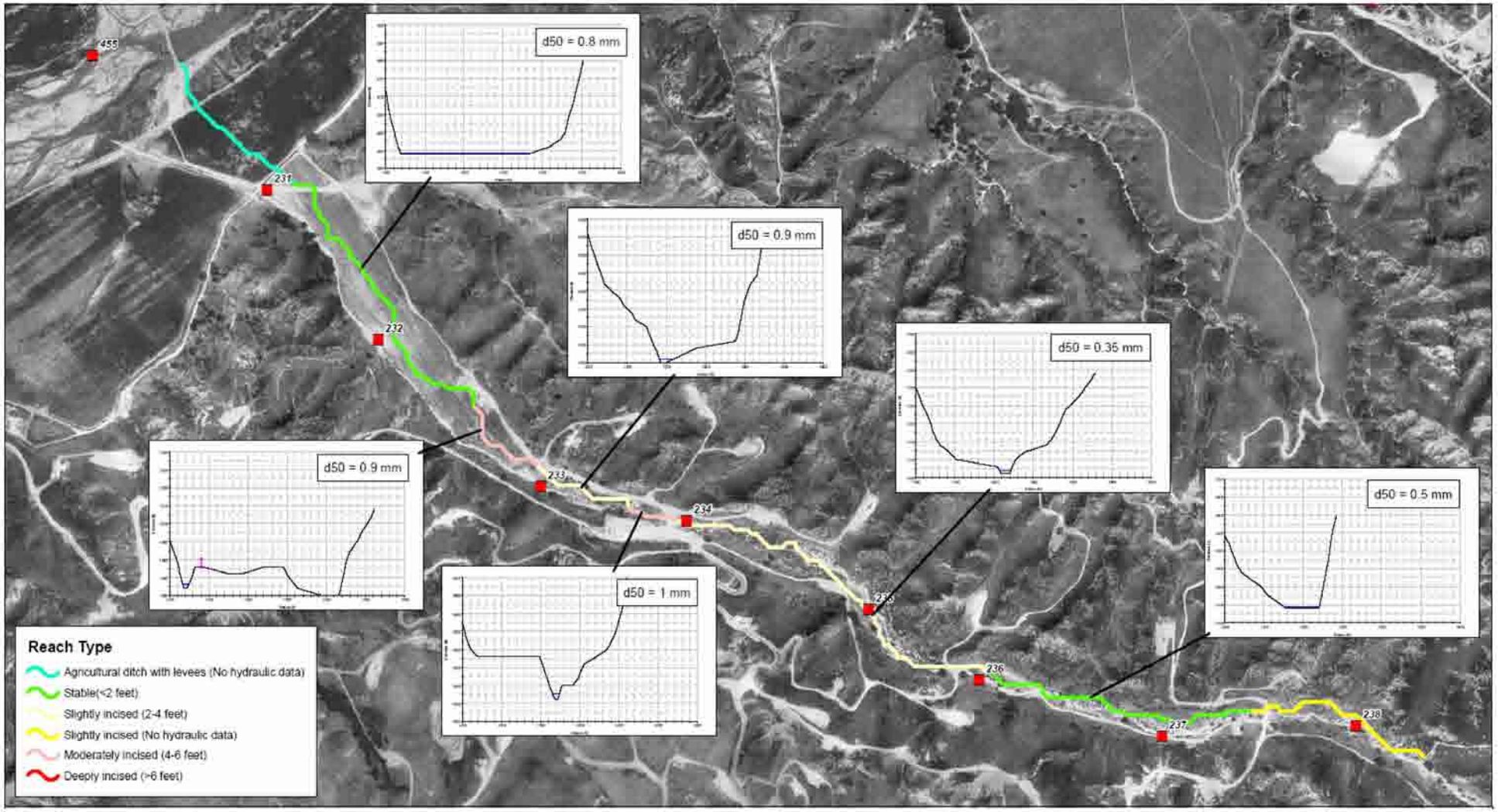
Long Canyon

Geomorphic Reconnaissance

Site Map (Note Images from 238 upstream are off project site)



Headwaters of canyon showing highly eroded slopes

Long #243a


Deeply incised headwaters reach
Long #242a


Sediment sample
LONG #244
BED (Rock
Sand)
Long #244


Stable reach (upstream) threatened by eroding headcut from unstable (downstream) reach
Long #us_242d


Moderately stable reach
Long #242d


Moderately stable reach
Long #242c


Sediment sample
LONG #242
BAR
Long #242b


Narrow, slightly incised reach
Long #241c


Narrow, slightly incised reach
Long #241b


Sediment sample
LONG #241
BAR
Long #241


Slightly aggradational reach
Long #240b


Slightly aggradational reach
Long #240a


Sediment sample
LONG #240
BAR
Long #240


Eroding relict terrace with new floodplain on inside bend
Long #239b

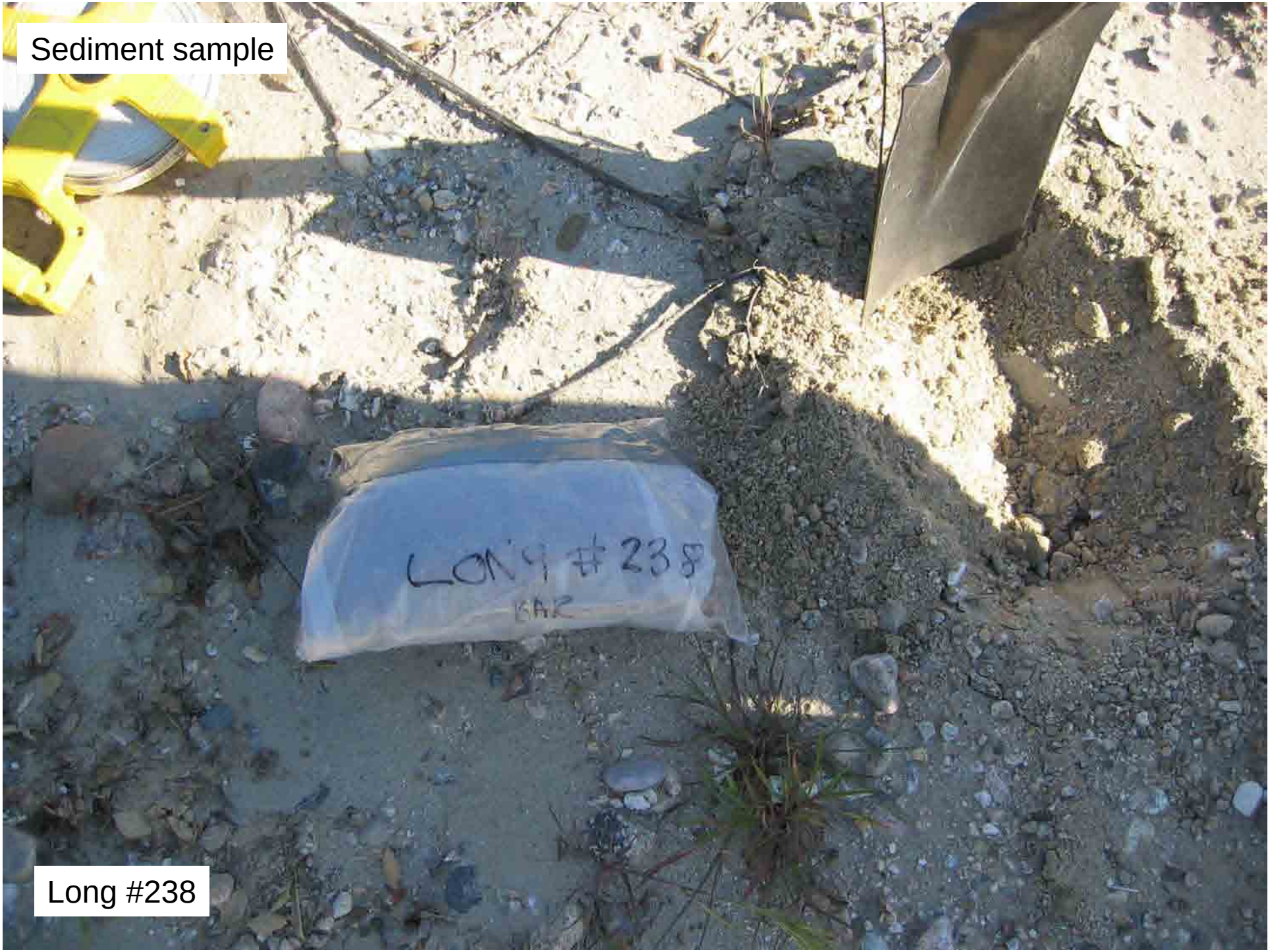

Eroding relict terrace with new floodplain on inside bend
Long #239a


Sediment sample
LONG #239
BAR
Long #239


Stable reach with low floodplain
Long #238c


Stable reach with low floodplain
Long #238b


Stable reach with low floodplain
Long #238a


Sediment sample
LONG #238
BAR
Long #238


Slightly incised reach with low floodplain on inside bend, eroding terrace on outside
Long #237b


Slightly incised reach with low floodplain on inside bend, eroding terrace on outside
Long #237a


Sediment sample
LONG
SITE 237
BAR
Long #237


Stable reach with low floodplain
Long #236b


Stable reach with low floodplain
Long #236a


Sediment sample
LONG #236
BAR
Long #236


Relatively stable reach with low floodplain on inside bends, eroded terrace on outside
Long #235b


Relatively stable reach with low floodplain on inside bends, eroded terrace on outside
Long #235a


Slightly incised reach with low floodplain on inside bends, eroded terrace on outside
Long #234b


Slightly incised reach with low floodplain on inside bends, eroded terrace on outside
Long #234a


Slightly incised reach with low floodplain on inside bends, eroded terrace on outside
Long #233a


Sediment sample
LONG #233
BAR
Long #233


Slightly aggrading reach with low floodplain on inside bends, eroded terrace on outside
Long #233b


Slightly aggrading reach with low floodplain on inside bends, eroded terrace on outside
Long #232a


Relatively stable reach with low floodplain on inside bends, eroded terrace on outside
Long #231d


Slightly confined reach with medium height floodplain terraces
Long #231


Slightly confined reach with medium height floodplain terraces
Long #231b


Constructed channel
Long #231c